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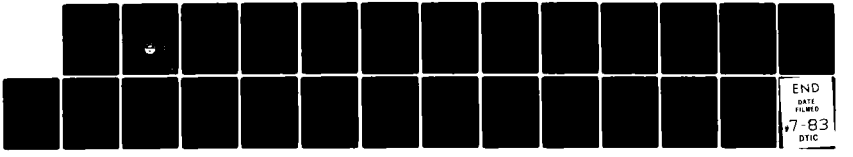

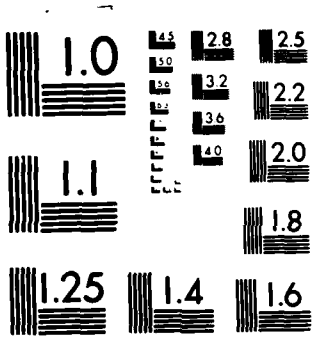

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NAVY PERSONNEL RESEARCH AND DEVELOPMENT CENTER
San Diego, California 92152

NPRDC Special Report 83-34 May 1983

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This report documents the conceptualization and design of a proposed prototype computerized Navy Personnel Accessioning System (NPAS) suitable for use in Navy recruiting stations. NPRDC Special Reports 83-35 and 83-36 respectively provide a summary of research and development efforts and products resulting from the NPAS project and the development of a microcomputer-based demonstration system.

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FOREWORD

This research and development was conducted within exploratory development task area 64709N (Prototype Manpower/Personnel System) and was sponsored by the Chief of Naval Operations (OP-01). The purpose was to design, develop, test, and evaluate a Navy Personnel Accessioning System (NPAS) designed to (1) serve as a data base management and labor-saving device for the Navy Recruiting Command (NRC), (2) assign recruits optimally to Navy jobs and reserve training school seats, (3) provide individualized career information with fewer support personnel than at present, and (4) ensure improved person-job placement. It was expected that this system would benefit the NRC and the Naval Military Personnel Command. However, Navy funding for research and development (R&D) efforts on NPAS was terminated on 30 September 1981 as a consequence of large program element reductions.

This is the first of three reports documenting work on the NPAS project for Navy managers and the R&D community. The others provide a summary of research efforts and products resulting from the project and the development of a microcomputer-based demonstration system (NPRDC SRs 83-35 and 83-36).

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SUMMARY

Problem and Background

Present accessioning methods are inadequate for screening and assignment, place clerical burdens upon the recruiter, and provide limited vocational guidance. Therefore, the Navy Personnel Accessioning System (NPAS) project was initiated to (1) investigate the technical and economic feasibility of automating the functions involved in accessioning recruits and (2) identify the possible benefits to be obtained by automating these functions. As the project progressed, it became apparent that these were two types of accessioning functions: (1) those related to person-job matching (PJM), which includes applicant screening with adaptive testing, vocational guidance, and assignment prediction, and (2) those related to recruiting management support (RMS), which includes data handling, forms generation, and report generation. Therefore, PJM and RSM subsystems were designed. However, they were not completed because of funding reductions.

Objective

The objective of this report was to provide an overview of the PJM and RSM subsystems.

Results

The PJM and RSM subsystems are described in terms of the rationale for and methods of operation and benefits to applicants and to the Navy.

Conclusions

NPAS provides the conceptual base for making the accessioning process more efficient and effective, using the latest developments in personnel research and computer technology. The applicant-oriented PJM functions would enhance the Navy's public image and increase the probability that applicants would enlist in the Navy and convince friends to visit the Navy recruiter. The RMS functions would save recruiter time, reduce clerical error, and facilitate reporting.

Recommendations

1. The concept of a computer-based accessioning system should be further refined by delineating candidate functions that could be supported by such a system.

2. The possible component functions of a complete accessioning system should be evaluated in terms of needs, costs, and Navy policy.

3. A detailed economic analysis of the feasibility of full-scale implementation should be conducted.

4. Research and development of a prototype personnel accessioning system should be initiated.

CONTENTS

LIST OF FIGURES

INTRODUCTION

Problem

Computer technology is increasingly being applied to personnel management and administration due to the decreasing costs of equipment and marked progress in systems automation. Data processing systems are in greater demand at ever lower echelons within the Navy Recruiting Command (NRC), with several already in operation. Therefore, the Navy Personnel Accessioning System (NPAS) project was initiated to (1) investigate the technical and economic feasibility of automating the functions involved in accessioning recruits, and (2) identify the possible benefits to be obtained by automating these functions.

The intent of the NPAS project was to design, develop, test, and evaluate a distributed processing Navy personnel accessioning network. Computer-based personnel management techniques were to be integrated into a system designed to (1) serve as a data base management and labor-saving device for the NRC, (2) assign recruits optimally to Navy jobs and reserve training school seats, (3) provide individualized career information to applicants with fewer support personnel than at present, and (4) improve person-job placement.

Background

Available Computer-assisted Systems

There are at least 19 major computer-assisted systems in the civilian community, including statewide and national systems. Because the system designs are based on different rationales or models of career decision-making, they employ varying procedures (Shatkin, 1980). Of the many systems in use, three have goals somewhat akin to those of NPAS: (1) the Computerized Heuristic Occupational Information Career Exploration System (CHOICES), which was developed by the Canada Employment and Immigration Commission, (2) the Discover System, which was created by the Discover Foundation and subsequently refined and expanded into Discover II, and (3) the System of Interactive Guidance and Information (SIGI) (McBride, 1979; Weiss, 1978), which was developed by the Educational Testing Service.

In military-specific computerized adaptive testing, the Navy Personnel Research and Development Center (NAVPERSRANDCEN) was designated as the lead laboratory in the Navy Department-chaired Computerized Adaptive Testing Interservice Coordinating Committee. The Air Force is responsible for item bank development; and the Army, for procuring a delivery system that could be incorporated into the military entrance processing station (MEPS) system.

NAVPERSRANDCEN has developed a system called Computerized Navy Techniques for Recruiting, Assignment, Counseling, and Testing (CONTRACT), which is capable of (1) automating the procedures used to generate recruiting goals, (2) automating fiscal and supply data management for a Navy recruiting district, (3) developing and demonstrating a computerized Navy vocational information system, and (4) developing the Classification and Assignment within PRIDE (CLASP) system. CLASP, managed by NRC, employs an optimal sequential assignment algorithm used with the Personalized Recruiting for Immediate and Delayed Enlistment (PRIDE) system. CLASP has five components: school success, aptitude/complexity, Navy need/preference, minority fill, and fraction fill.

The Army Research Institute has developed the Officer Career Information and Planning System: a computer-aided system providing a number of benefits, including increased responsibility of the individual for career planning, increased knowledge of the career-enhancement value of alternative assignments, improved person-job matching (PJM), increased equity in the personnel system, and enhanced satisfaction with actual assignments.

"Manning the Force," an effort of the Army Recruiting Command, has resulted in the development of the Joint Optical Information Network System. This microcomputer-based system was designed for use in the recruiting station and will eventually communicate with the Army Recruitment and Accession Data System. The functions supported by this system include sales presentation, leads, requirements, screening, applicant processing status, delayed entry program management, command communication, training, and testing.

The Army, with the Recruit Quota System, and the Navy, with the PRIDE system, have automated the assignment function of school seat reservations. The Air Force Human Resources Laboratory has developed a Procurement Management Information System for classifying recruits, including optimal sequential assignment.

Initial Conceptualization of NPAS

The NPAS steering committee held its initial meeting in Washington, DC in September 1978 to (1) familiarize committee members with project goals, (2) identify the offices represented by the members, (3) identify other Navy and Department of Defense (DoD) offices that should be represented, and (4) define the role and responsibilities of the steering committee. In FY79, when the project began, an extensive effort was devoted to coordination with offices of the NRC, the Naval Military Personnel Command (NMPC), and the OP codes. Preliminary system planning was reflected in a series of Navy decision coordinating papers that were routed for review and comment. Also, procurement of the needed computer equipment and the preparation, review, evaluation, and award of contracts for research were targeted in 1979.

Whereas Navy recruiting targets many subpopulations for accessioning (e.g., Navy veterans, veterans from other services, nonprior-service female applicants, officer applicants), NPAS efforts focused on nonprior-service male applicants because they are the major subpopulation recruited. Once implemented, the system could be expanded to address the recruiting of other groups.

The distributed reservations capability makes it possible for recruiters to make "A" school assignments from the recruiting station (front-end assignment). However, assignments at the recruiting station would require a major policy change. A preassignment method is being developed that predicts which ratings would be open upon the applicant's arrival at MEPS for the classification interview. Vocational guidance counseling and assignments to training would then be based on those open ratings.

Interest measurement is essential in the vocational guidance of career-naive applicants, but extensive modification to the PJM and assignment algorithms would be required to use this information. An alternative would be to offer interest measurement as an informational and educational adjunct in career exploration to assist applicants in voicing their preferences.

Initially, the focus was on a minicomputer configuration so that NPAS could counter the rise in time-sharing costs and the associated burden of telecommunications. However,

main efforts switched to development of a microprocessor-based system due to the rapid advances in microcomputer technology. Alternative configurations continued to be evaluated for capability, interface with existing systems, and cost effectiveness (Baker, 1983b).

General Approach

The approach for automated information systems (delineated in DoD, 1978, DoN, 1979) was used for developing NPAS. This approach includes five broad phases:

1. Mission analysis and project initiation. Identify and validate a mission element need (i.e., a set of functional requirements) and explore alternative means of addressing that need.

2. Concept development. Develop and evaluate alternative means of addressing the mission element need identified in the initial phase and recommend one or more concepts for future exploration.

3. Definition/design. Define the specifications for the system or subsystem and design an operable manpower, personnel, and training information system.

4. System development. Develop, integrate, test, and evaluate the total system.

5. Deployment and operation. Conduct full-scale deployment and monitoring of the system.

During the first phase, the functional requirements were identified and coordinated with the steering committee. Results showed that there were two types of accessioning functions: (1) those related to person-job matching (PJM), which included applicant screening with adaptive testing, vocational guidance, and assignment prediction, and (2) those dedicated to recruiting management support (RMS), including data entry, storage, and retrieval; forms generation; and reports generation (see Figure 1). Thus, needs assessment studies were conducted to determine how these functions met the documented needs of Navy recruiting (Baker, 1983a; Giese & Wyrick, 1981).

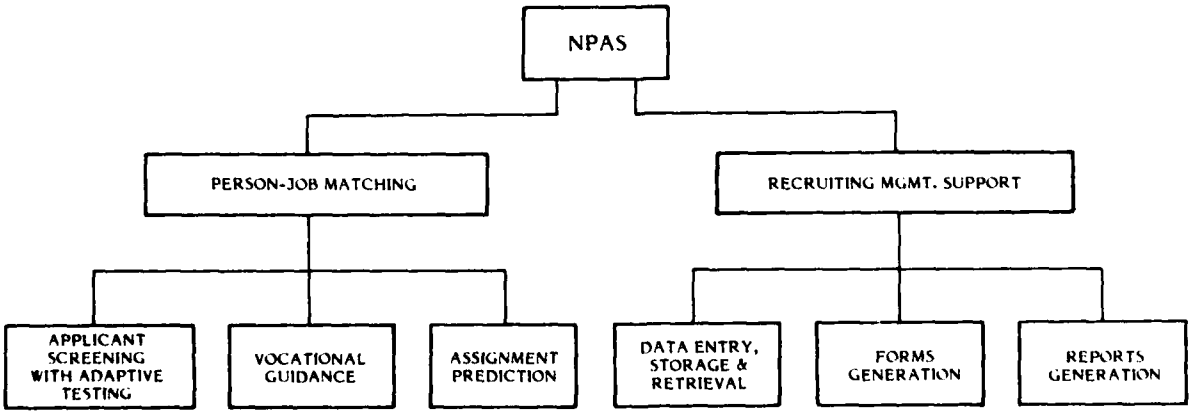

Figure 1. NPAS functions.

Work conducted during the second phase was based on the results of the needs assessment studies and information received from Navy managers. However, during this phase (30 September 1981), research and development (R&D) efforts on NPAS were terminated because of large funding reductions. Therefore, an economic analysis that had been planned for the FY subsequent to the cancellation date could not be accomplished.

RESULTS

This section describes the two NPAS subfunctions in terms of the rationale for and the recommended methods of operation and the benefits for the Navy and the applicant.

Person-Job Matching (PJM) Subsystem

The PJM subsystem allows (1) the prospective enlistee to closely interact with the Navy representative who is best able to deal with clients on an individual basis, (2) the prospective enlistee to be considered as an individual, (3) vocational guidance to be provided through a process of self-exploration, career goal setting, and decision making, and (4) the enlistment process to be completed using optimal assignment techniques. It includes applicant screening with adaptive testing, vocational guidance, and assignment prediction. These activities are described below.

Applicant Screening with Adaptive Testing

Adaptive Testing. The Computerized Adaptive Screening Test (CAST), used in PJM screening, incorporates adaptive testing, which is "tailored" to the ability level of each subject. Therefore, improvements in both recruiting results and efficiency can be expected. While several branching strategies are available, adaptive testing essentially means that each subsequent question is chosen based upon the subject's correct or incorrect response to the previous question. In other words, a correct response is followed by an item that is more difficult; and an incorrect response, by an item that is less difficult. There is little chance that two subjects will receive the same test, or that a subject, when being retested, will receive the original test.

Adaptive testing manifests important advances in human measurement science and results in a test superior in equiprecision across the distribution and therefore of increased reliability (Weiss & Betz, 1973). It has been demonstrated that adaptive testing requires less time than usual testing methods. Shorter tests may be used without loss of reliability or validity (Betz & Weiss, 1975; Weiss, 1974). On a selection or screening test, adaptive testing reduces the number of erroneous rejections and acceptances (Types I and II errors). Since adaptive tests are not timed, pressure on the subject is reduced without burdening the proctor (Weiss, 1976). Also, adaptive testing reduces boredom and frustration (Weiss, 1974), guessing (Betz & Weiss, 1975), and (real or perceived) general proctor-subject bias (Gorman, 1977) or culture-specific bias (Pine, 1977). Because adaptive testing is more motivating, it elicits the subjects' best efforts (Betz & Weiss, 1976) and reflects their competence more accurately (Pine, 1977). Adaptive testing, which has come fully of age (Weiss & Betz, 1973), represents a return to individualized testing (Vale & Weiss, 1975) and is superior in all respects to peaked or conventional tests (Gorman, 1977).

Computerized Testing. Computerized testing makes it possible to include additional specialized tests in screening batteries that were previously precluded by time and cost considerations (Cory, 1977). It applies on-line computers to the administration of tests that adapt themselves to individual differences in ability levels during the adminstration

process (Pine & Weiss, 1979). Interactive dialogue provides immediate results without the necessity of error-prone, manual scoring. Immediate knowledge of results has been shown to be a motivator to better performance (Pine, Church, Gialluca, & Weiss, 1979; Prestwood, 1977; Weiss, 1976; Betz & Weiss, 1976). Computerized testing lessens test bias through item selection and increases test fairness by the nature of the test itself and the test's administration modality (Pine & Weiss, 1979). Reliable data are obtained by computerized adaptive testing because it effectively shortens testing time without losing effectiveness and eliminates scoring and recording errors due to clerical mistakes (Gorman, 1977). The union of computers and adaptive testing has remarkably improved, yet simplified, human measurement (Weiss, 1976) and computers have become necessary in accessioning (Gorman, 1977).

Benefits and Potential Applications. Since CAST eliminates the need for traditional test materials, savings are accrued through reduced storage space requirements, repetitive materials replacement costs, recruiter time (formerly used for daily accounting and maintenance of test materials), and the monthly packing and delivering of completed test materials to the district headquarters. Having no materials in the usual sense, CAST nearly eliminates test loss, theft, or compromise. Security is maintained by a built-in user identification password. Rather than serving as a test proctor-scorer, the recruiter simply manages a computer-subject dialogue. The test is automatically scored, results are stored on computer-readable media, and interpretation of results is immediately available.

Cost effectiveness results from the already-mentioned obviation of all traditional test materials and from decreased demands on recruiter time. The Civil Service Commission determined that, although computerized adaptive testing costs are equal to pencil-and-paper testing costs, their utility far exceeds that of conventional tests. Computerized adaptive testing is best served by distributive computer processing (Weiss, 1976). Subsequent to recovery of initial software investment, CAST would continue to effect substantial savings in money, time, and workload throughout the Navy recruiting service.

Far more significant savings could accrue as a result of a more effective prescreening instrument. This would include saving transportation costs that occur when applicants are sent to MEPS to take the Armed Services Vocational Aptitude Battery (ASVAB) and fail, as well as social costs arising from disappointment when an applicant who passed the Enlistment Screening Test (EST) fails to qualify on the ASVAB, or when an applicant is lost to the Navy workforce because he is erroneously rejected.

CAST is important for its potential economizing service and for its enabling functions. CAST would replace EST, a prescreening test used by the Navy. Implementation of CAST would place the Navy in the enviable position of being highly responsive to advances in psychometrics and managerial science, as well as being able to rapidly adapt the system when desired. It is predicted that the optimal use of computerized ability testing systems will be in organizations serving populations of wide-ranging ability (DeWitt & Weiss, 1974). The Navy is in the forefront of employing this method, which allows more rigorous screening and analysis of predictors of tenure and effectiveness (Sands, 1977) as well as expectations, intentions, job-perceptions, and attitudes (Horner, Mobley, & Meglino, 1979). Screening could be used for specific placement as well as acceptance if it is demonstrated that CAST can be used to predict aptitude area scores on ASVAB. Classification testing would be significantly improved through a much broader array of measures, including special abilities and even biodata (Swanson & Rimland, 1970). This is possible because the administration and motivational problems associated with

lengthy testing and examinee fatigue have been partly solved by automation. Fiscal and operational considerations would ensure expanded use of existing hardware.

Adaptive testing, using unique Navy items on tests targeting the Navy applicant pool, could also be used to measure attitudes, interests, motivations, and adjustment potential (Cory, 1977). The technical sophistications enabled by computerized systems (e.g., movable stimuli) (Cory, Rimland, & Bryson, 1977) might be applied to adaptive testing. Presently, computers are better predictors of school success than is the average human classifier (Dow, Wolfe, Moonan, Swanson, & Taylor, 1964). Current R&D focuses on an adaptive form of the ASVAB. It may be possible that this form, when operational, could be implemented on the hardware already in use for CAST. With CAST, the Navy could prepare for a computerized, adaptive form of ASVAB (CAST-ASVAB) while familiarizing future user personnel with adaptive test administration.

Computerized adaptive testing posits for the future a significant reduction in misclassification, enhanced discrimination of subject abilities, and a profitable interface with classification, assignment, and job information systems (Gorman, 1977). As noted by DoD, there must be marked improvements in measuring individual attributes, in relating these attributes to on-the-job performance, and in gauging performance rather than trainability alone (Pirie, 1980).

The Armed Forces Qualification Test (AFQT), a composite of ASVAB subtest scores, is increasingly being studied and its reliability and validity is being questioned (Pirie, 1980; Plag & Goffman, 1967; Congressional Budget Office, 1980; Army throws out GI intelligence test scores, 1980). The need has long been apparent for a test specifically applicable to the Navy (Cory, 1977; Swanson & Rimland, 1970). CAST, designed for the Navy, answers present needs by streamlining the screening process, which enhances the Navy's position in recruit screening. When ASVAB is computerized and adaptive, MEPS processing might require only 1 day, saving lodging expenses (Ree, 1977). Since adaptive testing has been demonstrated to be feasible at the MEPS level (Ree, 1977), the next logical step is to implement CAST at the recruiting station. The accessibility of test results facilitates further validity studies of tests (Gorman, 1977).

Vocational Guidance

Description. For youth about to enter the job market, the Navy's PJM system serves as the bridge between school and work. To do this, the system begins by exploring an individual's interests, motives, desires, and aptitudes. Since the typical enlistment candidate does not have an extensive work history and is malleable with respect to career choice, the Navy has an opportunity to build a guidance system that facilitates vocational exploration and identification of preferred careers. Decisions about career fields would be made more intelligently in light of life planning and awareness of the relationship between Navy and civilian jobs. Granting the potential enlistee an informed part in a career decision process enhances the career satisfaction of those who enlist. The point is to improve personnel retention by decreasing career dissatisfaction through the enlistment of people who know their goals and choose wisely.

Navy needs and candidate desires need not conflict. The overall recruiting situation subsumes three elements: (1) personal interests, experience, and ability factors, (2) career choices (narrowed to available options), and (3) exploration of probable results of choices (with a narrowing of choices). A fourth element--a decision--is the desired result: a decision mutually beneficial to the individual and the Navy. Presumably, longer commitment will eventuate from deeper consideration of how Navy objectives can be married to individual goals.

Computer-based systems of interactive guidance are attractive and effective (Pierce, 1972; Larkin, 1975). The Navy vocational information system demonstrated clearly the usefulness of vocational guidance and acceptance on the part of the user (Yellen & Foley, 1978). These systems make candidates feel that they have control over their destiny, often correcting poorly-made choices made in the past by using interest exploration.

An interactive program of guidance introducing the system to the user is integrated into NPAS. The interactive program progresses through an interest inventory, career motivation exploration, and alternative testing and ends with some decisions about future Navy service (Sands, 1980). The system offers immediate implementation of certain guidance functions, plus the flexibility to insert additional materials in either modular or single-item manner. Interests are measured by administering the Vocational Interest Career Examination (VOICE) and are then related to Navy occupational fields. The applicant is then counseled on the importance of career planning and the relationship of aptitudes and interests to careers. The applicant's ASVAB scores are interpreted to highlight aptitudes and to identify those Navy occupations for which the applicant qualifies on the basis of ASVAB scores. NPAS encourages exploration of those Navy ratings related to civilian jobs that are of interest to the prospective enlistee. Descriptions of ratings are delivered on screen and in hard-copy form. Civilian jobs that match the prospects' occupational interests and educational plans are identified, and an explanation is given of the value of Navy training and experience in terms of future entry into the civilian job market. It also identifies inconsistencies in the individual's planning, indicating where occupational and educational indicators, tested ability, and aspirations are not compatible. Finally, the system presents a realistic preview of Navy life-style and career benefits.

Benefits and Potential Applications. Subsequent refinements could include use of tests specific to particular occupational fields or ratings, automatic calculation of predictors of school success, or odds-for-effectiveness. This information would be helpful to persons making decisions to enlist in the Navy and to recruiting personnel making selection and classification decisions.

The PJM system would undoubtedly slow the enlistment process because time is spent in considering personal desires and potential satisfaction through service in the Navy. Paradoxically, slowing the enlistment process might well hasten increases in accessions quality, job satisfaction, and retention (Pirie, 1980) and would emphasize that PJM is the joint responsibility of the Navy and the individual.

Assignment Prediction

Description. A preassignment capability integrated into the PJM system ensures timely response to applicant's questions. At a minimum, the preassignment function provides data for serious career deliberations on the part of the prospect.

It has been demonstrated that the computer can swiftly and accurately classify personnel according to decision criteria analogous to a human evaluator but with far greater speed, accuracy, and capacity (Dow et al., 1964). The computer has the ability to handle vast amounts of data, effecting assignment of people to areas where they have potential for above-average performance. Moreover, a host of elements can be included in computerized classification that have the potential for meeting the Navy's needs (Rimland, 1966). Accommodating enlistees' preferences, to the degree specified by policy (and the weight of this factor is modifiable), is becoming necessary to compete in recruitment (Decision Systems Associates, 1970). Preference accommodation, based upon

informed preferences--not promises--can be included in Navy assignment with the computer-based recruiting system.

Sequential assignment became important when the Navy could no longer enlist a pool of applicants and make optimal assignments based on knowledge of all applicants and all jobs simultaneously. This change occurred concurrently with the inception of the all-volunteer force. The result was a recognized need to combine occupational choice subsequent to vocational guidance within one-by-one assignment constraints. Recently, sequential assignment of enlistees as they appear one at a time made it possible to meld individual interests and preferences with Navy needs, unlike assignment strategies using only demographics and probabilities (Thomason, 1979). An assignment strategy is optimal when the payoff resulting from all PJMs is maximized. Optimal sequential assignment was the goal and result of the CLASP development (Kroeker, 1979).

Presently, only the MEPS classifier makes assignments. However, NPAS offers a method for accomplishing assignment at the recruiting station with similar treatment for all applicants. Additionally, all evidence points to the recruiting station as the site where the enlistment prospect is most conducive to career decisions. The applicant is in the company of the recruiter, rather than undergoing a 15-minute, pressurized classification interview at MEPS (Baker, 1983a). The recruiter must have timely knowledge of assignment availability in order to discuss these with the prospect. Front-end assignment, then, is tied with front-end availability of information.

Pre-CLASP offers economical and speedy validation of the Navy occupation ratings choices using the computer and the immediate availability of a subset of actual assignment options. With a more accurate forecasting of available ratings, there should be fewer applicants deciding not to enlist after going to MEPS for the classification interview. NPAS standardizes the occupational information presented to potential enlistees. Time could be saved by limiting discussion of ratings to those that are open and optimal for the individual. In addition, disappointment from erroneously-perceived expectations would be avoided. Sequential assignment would optimally match "A" school openings with "A" school eligibles. A related benefit would be a decline in "ghost" reservations, because options provided by pre-CLASP closely approximate those available from CLASP at the MEPS site. The preassignment would not interfere with the actual assignment process accomplished at MEPS. A lengthened and informed career decision process should result in a better PJM, less "forced choice" entries, more realistic expectations, heightened career satisfaction, and increased retention.

Benefits and Potential Applications. As needs and policies change, as related research exposes reliable predictors of success, survival, and reenlistment, and as other predictors become known, they can all be incorporated into assignment algorithms (Thomason, 1979). Given the success of pre-CLASP, little more than a policy change would be necessary to effect actual assignments at the recruiting station, where the prospective enlistees perceive the most interest in their careers. Pre-CLASP, therefore, in immediate application and in implications, conduces to more effective, efficient, and personalized recruiting.

A PJM System Approach

The PJM subsystem could be readily expandable to subsume additional recruitment functions. With modular construction and built-in technology transfer, many future modifications and improvements to the system may be effected without adversely affecting efficiency. The system is evolutionary in nature, permitting and even leading to encouraging incremental improvements. A more immediate benefit of NPAS is that it can

be used to process nonprior-service females and to reaccess male and female personnel with prior service, thus reducing the need for nonprior-service males (Congressional Budget Office, 1980). It could also be used to extend the vocational guidance service to first-term personnel nearing completion of their obligated service or to reassign personnel whose jobs have been made obsolete (Landau & Farkas, 1978). Raw data generated by the system further aids research and facilitates upgrading the system itself. The PJM subsystem offers a means and a location for providing realistic military service and job preview (Horner et al., 1979; Griffeth, Meglino, Youngblood, & Mobley, 1979). Further, simulation of the interaction between the individual and the organization (a key to attrition problems) enhances PJM (Wiskoff, Atwater, Houle, & Sinaiko, 1980). It is possible to unite the research on placement with research on skill needs (Brown, 1980). Using the computer's potential, results of adaptability testing can be stored and compared with the results of achievement testing. Importantly, NPAS is a system that would make career guidance and decision-making the joint responsibility of the recruiter and prospect. The PJM subsystem is able to anticipate and respond to the manifest needs already noted and the emergent needs in a world of rapid change. Finally, more centralized control of the accessioning system would result in greater uniformity, control, and command cognizance.

This systems approach effectively unites organization and job seeker in a mutual interaction. Decision under CAST is reserved to the Navy, decision under vocational guidance procedures is in the hands of the prospect, and decision under pre-CLASP is the joint province of the institution and the individual. The elements of the PJM subsystem effectively consider both individual and organizational concerns in matching the person to the job, as conceptually diagrammed in Figure 2.

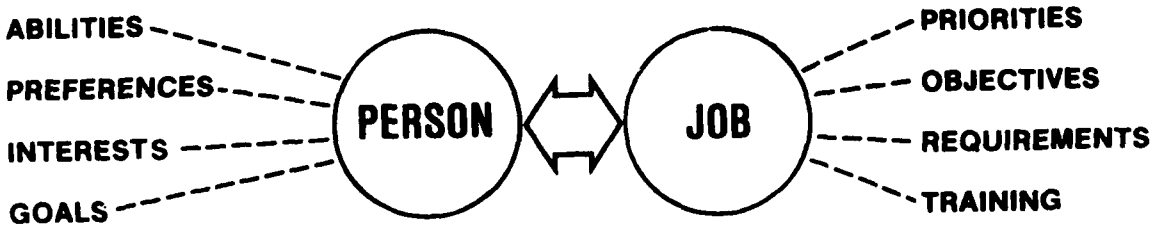

Figure 2. Elements of the PJM subsystem.

Recruiting Management Support (RMS) Subsystem

It is obvious that the more time recruiters spend doing administrative and clerical tasks, the less time they have available for actively recruiting prospects for enlistment. Time and space are used for storing and processing information, for preparing reports, and for preparing, checking, and editing completed paperwork. Recruiter malpractice can be reduced by eliminating unnecessary administrative and processing responsibilities (Comptroller General, 1981). Because data management is directly related to recruiting, classification, and assignment functions, its efficiency is important. With an efficient data storage and retrieval system, potential applicants can be contacted and processed in less time than at present and provided with more information about jobs.

The computer's ability to organize and store vast amounts of information, quickly retrieve these data on command, and present the data in usable form has increased operational efficiency. With on-site printing capability, the entire process results in

professional, accurate copy in a fraction of the time formerly taken by numerous clerical and management personnel. Although some recruiting administrative and management requirements have been automated locally in Navy recruiting districts and nationwide throughout NRC (Giese & Wyrick, 1981), such automation does not benefit all Navy recruiting stations (NRSs).

Recruiters and their supervisors are not only receptive to the prospect of automation, but they consensually voice their support for it. The NPAS RMS subsystem works in conjunction with the PJM subsystem to facilitate all phases of administration and management within the recruiting station. The three components of this function, together with their more immediate benefits and future possibilities, are discussed below. Arima (1976) and Giese and Wyrick (1981) provide information on the types, frequency, and number of forms, reports, files, and correspondence produced by a typical NRS. Some indication of the weekly clerical load at recruiting stations is presented in Table 1.

Table 1

Summary of Weekly Navy Recruiting Station Volumes for Primary Support Activities

Support Activity	Average NRS	Large NRS
New suspect/prospect cards created	31	53
New suspect/prospect cards filed	45	76
Old suspect/prospect cards purged	45	76
Suspect/prospect card file accesses	90	130
Suspect/prospect card updates	68	100
Tab G entries	64	94
Tab summarizations	3.6	4.6
Tab forms completed	16.6	22.6
Preparation of DD Form 1966	3	4.4
Enlistment kit attachments	36	52
Letters to police and references	11	17
Waiver requests	1	1.6

Note. Adapted from K. W. Giese and T. F. Wyrick, The Navy Personnel Accessioning System Needs Assessment for Personnel Management Support. Washington, DC: Federal Computer Performance Evaluation and Simulation Center, April 1981.

Data Entry, Storage, and Retrieval

The many files maintained by NRSs (e.g., suspect/prospect cards, the local effective accession delivery system, various "tickler" files, the recruiter tracking and analysis system) will be automated, saving storage space as well as many hours of manual data maintenance and retrieval. Figure 3 shows how NPAS can reduce required storage space and increase the accessibility of data files in an NRS. Additionally, training and policy guidance materials could be made available on terminals in the recruiters' offices. Finally, the capability for word processing accelerates and improves general correspondence and enhances the professional image of the NRS.

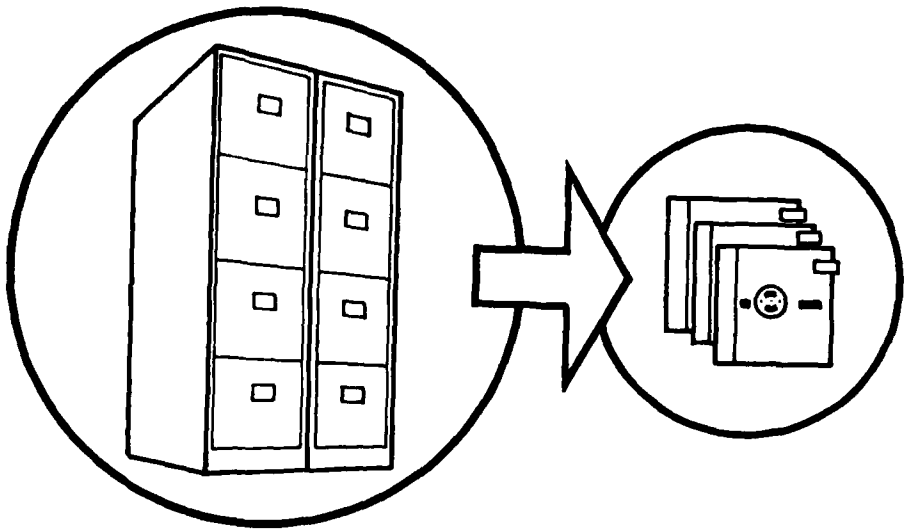

Figure 3. Placing files on-line at an NRS.

Forms Generation

The most time-consuming task in applicant processing is preparing the enlistment kit. In addition to the eight-page application for enlistment (DD Form 1966), several attachment forms must be prepared. For example, reference checks, which may number over 25, are sent to local and national personal and community references in each community where the applicant has lived. Often, data are redundant (e.g., items are entered over 10 times). Errors must be detected at several management levels during a checking process and corrected since they reflect adversely upon the organization and slow the enlistment process.

NPAS automates many of the procedures used for generating forms. The computer displays a menu of forms that can be printed, allowing the recruiter to select the desired form. Prompts from the computer elicit the required data to complete the selected form. The system includes a preprint review and edit capability. When data are absent or grossly insufficient to complete the form, the recruiter is notified. Finally, upon command, the system accomplishes rapid printing of finished, error-free documents. This function would free the recruiter of a significant portion of clerical tasks.

Reports Generation

Currently, scheduled reports involve several manual operations: data entry, storage and retrieval, and report preparation. Preparing reports with NPAS would be far simpler, more accurate, and require less time. The computer stores all needed data as part of its normal operations during applicant processing, files updating, etc. A menu of management reports is displayed, awaiting the recruiter's selection. At the recruiter's option, the computer formats and displays and/or prints the required report.

As the sensitivity of accessioning grows, unscheduled requests for reports (often called "as-required" reports) have increased. As management monitors the activities of the recruiter and the recruiting operation more closely, this type of reporting assumes greater frequency as well as importance. With NPAS, data to be used in formatted but

unscheduled reports (e.g., number of accessions, number transported to MEPS last month) would be stored in the course of day-to-day operations. The information would be displayed on the video display terminal, with the option of a printout. Thus, as-required reports would be prepared faster, making management information readily accessible.

Benefits and Potential Applications

With NPAS in operation, the Navy recruiters would have at their command a powerful system to simplify many office tasks. There would be no need for separate equipment for sales and administration. The PJM and RMS subsystems are coordinated for greater efficiency.

Immediate gains for automated accessioning include: storage of data on all persons processed through the system, item calibration and test-validation data, refinement of screening instruments, and manpower and personnel processing efficiencies. The employment of state-of-the-art methods and equipment would enhance the image of the NRS and the Navy recruiter.

The range of activities involved in Navy recruiting and accessioning (Giese & Wyrick, 1981) all lie within reach of the NPAS's positive effect, as shown in Figure 4. Regardless of the hardware configuration of the ultimate system, NPAS could be tied in with NRC computers for immediate telecommunication of data to managers, and of training, policy, and goaling information to recruiters. Data needed for individual accessions processing could also be electronically transmitted. With NPAS, NRC could anticipate an increase in electronic mail. Automatic prospect-contact scheduling, list production, and mailouts are but a few of the system's potential capabilities.

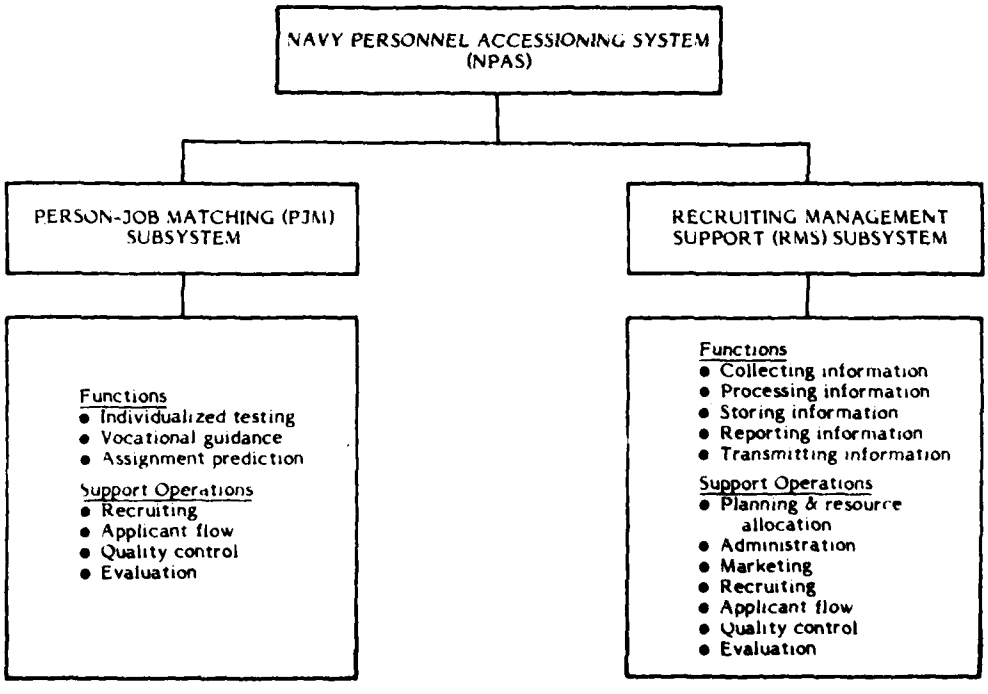

Figure 4. Potential scope of NPAS.

Note. Adapted from K. W. Giese and T. F. Wyrick, The Navy Personnel Accessioning System Needs Assessment for Personnel Management Support. Washington, DC: Federal Computer Performance Evaluation and Simulation Center, April 1981, p. 2.

Refinements in psychometric theory and application could be readily incorporated into NPAS through modular replacement or addition. Programs could be sent directly to the NRS computer on disk or telecommunicated directly to the station computer with automatic dial-up and automatic answering procedures. The addition of videodisc capability with computers in place could be accomplished at far less cost than without any computer equipment. The video capabilities could add another dimension to both sales vocational guidance processes.

CONCLUSIONS

As a system concept, NPAS provides the basis for rethinking the accessioning process. By using NPAS, which incorporates the latest developments in personnel research and computer equipment, the Navy would benefit from an immediate employment of adaptive testing, plus prepare its personnel for more long-range additional testing. Under the individualized testing function, CAST could replace EST, a conventionally-administered, paper-and-pencil aptitude test. Use of the CAST for aptitude screening offers a number of advantages over EST, including the following:

1. Increased measurement precision throughout the score range within which decisions are made, by reducing the number of screening errors (erroneous acceptances and erroneous rejections).

2. Reduced costs due to fewer errors in scoring, converting, and reporting results.

3. Reduced testing time.

4. Improved test security, due to the large number of potential items and the fact that each applicant receives a unique set of items.

5. Elimination of the printing, storage, and replacement costs of paper-and-pencil tests.

Vocational guidance is likely to increase the applicants' satisfaction with assignments and service. The vocational guidance information, including access to large data bases on Navy ratings and related civilian occupations, would make the applicants more knowledgeable and put them in a better position to make informed career decisions.

The pre-CLASP algorithm of the assignment prediction function forecasts the rating options likely to be offered to an applicant by CLASP during a subsequent classification interview. Time spent by the applicant considering these options, between the NPAS session at the recruiting station and the classification interview at MEPS, would result in a quick endorsement of one of the available rating options. This would significantly reduce the time presently spent by the classifier in convincing an applicant to enlist in one of the ratings offered by the CLASP system during the classification interview.

The various PJM applicant-oriented functions, delivered on powerful, responsive, state-of-the-art computer equipment, would create a very favorable public relations image in the eyes of the applicant for the Navy in general and for the Navy recruiter in particular. This would enhance the probability that the applicant enlisting in the modern, up-to-date Navy would convince friends to visit the Navy recruiter, thereby generating additional good enlistment prospects.

The RMS function, with capabilities for entering data and generating forms and reports, would save recruiter time, reduce clerical error, and make possible various reports that are not produced under manual procedures.

Research on network alternatives and hardware configurations would assist NRC in assessing its needs and options for automation, while reducing piecemeal acquisition of incompatible equipment.

RECOMMENDATIONS

1. The concept of a computer-based accessioning system should be further refined by delineating candidate functions that could be supported by such a system.

2. The possible component functions of a complete accessioning system should be evaluated in terms of needs, costs, and Navy policy.

3. A detailed economic analysis of the feasibility of full-scale implementation should be conducted.

4. R&D of a prototype personnel accessioning system should be continued.

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